

A Beta Estimate for FOXTEL

A Submission on the Access Undertaking of FOXTEL'S Management

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Public Version

Contents

<u>AUTHOR AND SCOPE OF REPORT</u>	3
<u>ASSUMPTIONS</u>	3
<u>MATERIALS PROVIDED</u>	3
<u>FEDERAL COURT GUIDELINES</u>	3
1. <u>EXECUTIVE SUMMARY</u>	4
<u>Overview</u>	4
<u>Approach</u>	4
<u>Summary of analysis and results</u>	5
<u>Conclusion</u>	7
<u>Past analyses</u>	7
2. <u>ANALYSIS OF AUSTAR</u>	8
<u>Weight given to Austar analysis</u>	8
<u>Analysis of Present Data</u>	8
<u>Robustness checks and outlier data points</u>	9
<u>2003 analysis by ACCC</u>	10
<u>Updated analysis</u>	11
<u>Adjustments for the technology bubble</u>	12
<u>Differences between Austar and FOXTEL</u>	13
<u>Conclusions from the analysis of Austar</u>	14
3. <u>EQUITY BETA ESTIMATES OF AUSTRALIAN BROADCASTING & CABLE TV FIRMS</u>	16
<u>Firms in the data set</u>	16
<u>Equity and asset beta estimates</u>	16
<u>Estimation error and confidence intervals</u>	17
<u>Comparison with 2003 Data</u>	20
<u>Conclusions</u>	21
4. <u>THE SYSTEMATIC RISK OF BROADCAST VERSUS CABLE TELEVISION COMPANIES</u>	22
<u>Approach</u>	23
<u>Qualitative arguments and empirical analysis</u>	23
<u>US evidence on industry sector systematic risk</u>	24
<u>Equity beta estimates of US Cable TV firms</u>	24
<u>Australian evidence on the market sensitivity of churn rates</u>	27
<u>Australian evidence on the market sensitivity of advertising revenue</u>	29
<u>Conclusions</u>	31
5. <u>CONCLUSIONS</u>	32

Author and Scope of Report

This report has been prepared by Prof. Stephen Faulkner Gray. I am Professor of Finance in the UQ Business School at the University of Queensland. I have Honours degrees in Commerce and Law and a PhD in Finance from the Graduate School of Business at Stanford University. A copy of my CV is attached to this report as an appendix.

I have been asked to provide my views on the following question:

1. What is an appropriate estimate of the asset and equity beta for FOXTEL?

Assumptions

I have been asked to make the following assumptions throughout this report:

1. FOXTEL has never paid a dividend to its shareholders and has no intention of paying a dividend to its shareholders in the foreseeable future.
2. FOXTEL has never been required to pay corporate tax and is unlikely to have to pay corporate tax in the next five years.

Materials Provided

I have been provided with the following materials and data:

1. The ACCC (December 2003) Section 152ATA Digital Pay TV Anticipatory Individual Exemption Application lodged by FOXTEL Management Pty Limited: Final Decision.
2. FOXTEL Profit and Loss Summaries for 2001-2005.
3. FOXTEL Subscriber Numbers and Customer Churn Data for 2001-2005.
4. Australian Broadcasting and Cable TV Advertising Revenue Data for 2001-2005.

I also refer to a number of public data sources, for which a full citation is provided within the body of the report.

Federal Court Guidelines

I have been provided with the "Guidelines for Expert Witnesses in Proceedings in the Federal Court". This report has been prepared in a way that is consistent with those Guidelines.

1. Executive summary

Overview

In this report, we estimate an appropriate equity and asset beta for FOXTEL by using a number of different approaches which rely on stock market returns, management and accounting data.

The equity beta is a measure of the systematic risk of the returns to equityholders. Systematic risk is a measure of the volatility of returns to investors due to economy-wide risks, as opposed to firm-specific risks. Finance theory contends that systematic risk is the appropriate risk measure for estimating the cost of capital as investors are able to eliminate firm-specific risk through diversification.

The systematic risk of owning shares in a firm depends on (i) the type of business the firm operates and (ii) the amount of corporate debt that ranks ahead of the equity investment. The former risk can be termed *asset risk* and the latter *leverage risk*. If a firm had no debt financing at all, the shareholders would only be exposed to asset risk. A firm's asset risk is quantified as an *asset beta*. This reflects the risk of operating a particular type of business (in relation to a broad market index).

If a firm does have some debt financing, there is leverage risk which must also be reflected in the risk of owning shares in the firm. The firm's *equity beta* incorporates both the risk of operating that type of business (the asset risk, as measured by the asset beta) and the risk of having debt finance that ranks ahead of equity (leverage risk). The process of adding the leverage risk to the asset beta in order to determine the equity beta is known as *levering* the asset beta. Throughout this report, we use the levering procedure that has been adopted by the ACCC.¹ This procedure is one of the appropriate levering procedures that has been documented in the literature. Moreover, given the relatively low level of debt in the benchmark capital structure in this case, the final weighted-average cost of capital is relatively insensitive to which procedure is selected for this purpose.

Approach

Our approach is to use a range of techniques and data sources to determine appropriate asset and equity betas for FOXTEL. It is important to use this type of approach when estimating betas. This is because individual beta estimates are imprecise and volatile. Our approach reduces reliance on a single type of data. Instead we seek to determine an appropriate beta estimate based on a considered analysis of a number of datasets and estimation methods.

Because FOXTEL is not separately listed, direct evidence on its equity beta is unavailable. The most direct evidence that is available, is that relating to Austar United Communications Limited (Austar). Austar is the only listed subscription television business in Australia. In this case, the relevant data is closely comparable as Austar and FOXTEL are both Australian subscription television businesses.

¹ ACCC, Section 152STA Digital Pay TV Anticipatory Individual Exemption Application Lodged by Foxtel Management Pty Limited, Final Decision, December 2003, acc.gov.au, p. 58.

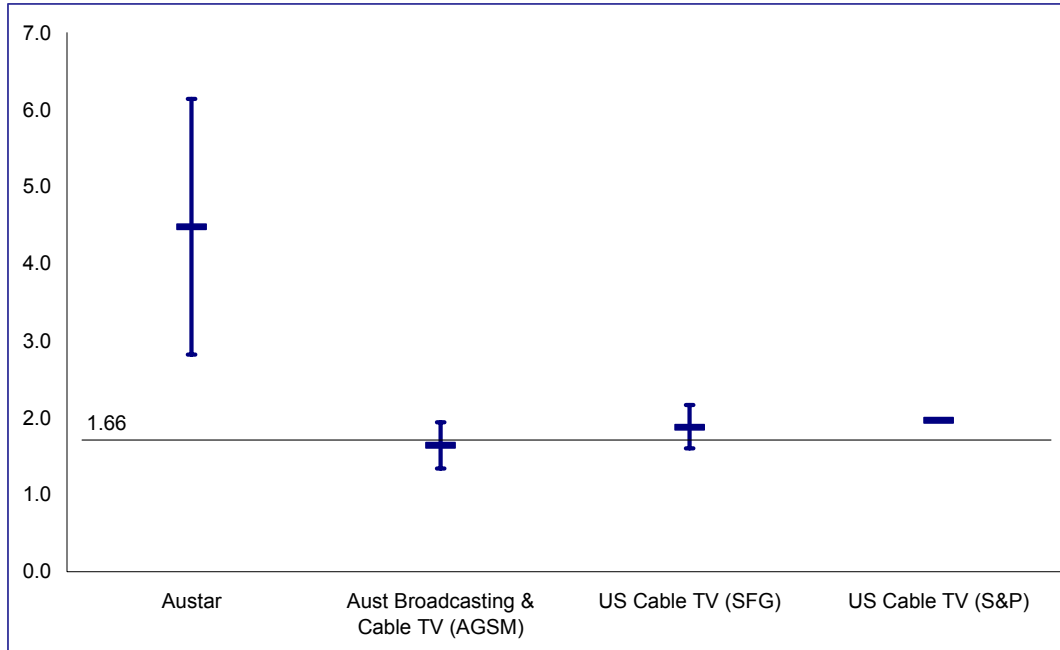
In other cases, the data is less directly comparable. For example, we also consider Australian Broadcasting & Cable TV businesses.² In this case, the sample of firms being considered is not directly comparable as the risks involved in broadcast television differ from those relating to subscription television. We examine data from cable television firms in the United States and compare this with data from firms that rely primarily on advertising revenue, as does the broadcast television business. We also examine the key revenue drivers for cable and broadcast television businesses. Cable television revenues depend primarily on subscriptions, whereas broadcast television revenues depend primarily on the sale of advertising. We examine the relationships between subscription cancellations and advertising revenues with stock market returns to assess the relative impacts on betas.

Summary of analysis and results

Our conclusions are based on a consideration of the following pieces of analysis:

- The closest available comparable firm is Austar. Using the ACCC approach, the present estimate of Austar's asset beta is 3.40. The most recent estimate of its equity beta, supplied by the Australian Graduate School of Management (AGSM) is 4.48.
- For a set of seven Australian Broadcasting & Cable TV firms with current market capitalisation greater than \$400 million, the average equity beta estimate is presently 1.64.
- For a sample of 10 US Cable TV firms with current market capitalisation greater than A\$400 million, the mean equity beta estimate is presently 1.97 according to data compiled by Standard and Poors (S&P). For a broader sample of 20 firms compiled by ValueLine, the mean equity beta estimate is presently 1.75.
- Given the statistical imprecision inherent in beta estimation, we estimate 90% confidence intervals for the equity betas of Australian Broadcasting & Cable TV firms and US Cable TV firms. These confidence intervals are presently 1.34 – 1.94 for the Australian firms and 1.60 – 2.16 for the US firms. Hence, these confidence intervals overlap in the region of 1.60 – 1.94. Equity beta estimates and confidence intervals for different samples of firms are illustrated in Figure 1.

² Throughout this report the capitalised term "Broadcasting & Cable TV" refers to a specific sub-industry according to the Global Industry Classification System (GICS) of Standard & Poors, the capitalised term "Cable TV" refers to the Cable and Other Pay Television Services industry according to the Standard Industrial Classification System (SIC) of the US Government. The uncapitalised terms broadcast television and cable television refer to television services supplied on a free-to-air and subscription basis, respectively. In other words the terms broadcast television and free-to-air television are interchangeable, as are the terms cable and subscription television.



Source: The mean equity beta for Austar was obtained from the AGSM March 2005 report and its 90% confidence interval is estimated with reference to the standard error obtained in that report assuming a t-distribution with 47 degrees of freedom. The mean equity beta estimate for seven Australian Broadcasting & Cable TV firms is obtained from data in the AGSM March 2005 report and the 90% confidence interval for this dataset is estimated using the bootstrap technique detailed in Section 3. The mean equity beta estimate for ten US Cable TV (S&P) firms is obtained from data supplied by S&P as at March 2005. No confidence interval is estimated as this dataset does not contain the standard error of each beta estimate. We re-computed the mean equity beta estimate for these firms using five years of monthly returns and present these results as US Cable TV (SFG). The mean equity beta estimate was 1.88. This computation allowed us to estimate the 90% confidence interval illustrated above.

- Whether FOXTEL, as a subscription television business, has more or less systematic risk than the average broadcast television firm is difficult to quantify definitively given the available data. However, it is possible to investigate the relationship between the key drivers of revenue for each type of business and market returns. FOXTEL has argued that subscription television is a luxury good that exhibits high elasticity. Other parties have argued that the key driver of broadcast television revenues is advertising, which is also closely related to economic circumstances. We examine the relationship between FOXTEL's churn rate (after controlling for the generally downward trend in churn rates) for each six-month period and the return on the ASX 200 index over the previous six months. The correlation between these variables is 85% and a regression of churn rates on lagged market returns is highly statistically significant with 70% of the variation in churn rates being attributable to market movements. We perform a similar analysis of the relationship between total television advertising revenues and lagged market returns. There the correlation is only 62% and the regression analysis suggests that the relationship is statistically insignificant. This implies that the relationship between churn rates (the primary driver of subscription television revenues) and market returns is stronger than the relationship between advertising revenues (the primary driver of broadcast television revenues) and market returns – in a statistical sense. Although it is impossible, given the available data, to quantify the impact of these relationships on asset and equity betas, we do note the strong and statistically significant

relationship between churn rates and market returns. For this reason, we consider the beta estimates for broadcast television comparables to be a lower bound for a reasonable estimate of the beta of a subscription television business such as FOXTEL.

Conclusion

Based on a full consideration of all of the available evidence, we are of the view that a reasonable estimate of FOXTEL's present equity beta is from the range of 1.5 to 1.8. This is consistent with an asset beta (using the ACCC approach) from the range of 1.3 to 1.5.

Past analyses

The ACCC has recently performed an analysis of the systematic risk of FOXTEL. In the Final Decision on FOXTEL's Digital Pay TV Anticipatory Exemption Application, the ACCC determined that appropriate estimates were:

- Equity Beta: 1.66
- Asset Beta: 1.40

In addition to providing an estimate based on presently available data, we also compare and contrast the evidence on which the ACCC's 2003 determination was based with more recent data. Comparing the recent data to that available in 2003 provides an indication of whether one should contemplate increasing or decreasing the 2003 estimate. The movement in all of the data that we examined reflected an increase in beta estimates over the last two years:

- The closest available comparable firm is Austar. Since the ACCC's December 2003 Report, the equity beta estimate for Austar (supplied by the AGSM) and the asset beta that is derived from it have increased substantially. The data relied on by the ACCC in 2003 led to an asset beta estimate of 1.2. Using the same data sources and the same approach, the present estimate of Austar's asset beta is 3.40.
- Since the ACCC's December 2003 Report, there has been an increase in the equity beta estimates of Australian Broadcasting & Cable TV firms. For a set of seven firms with current market capitalisation greater than \$400 million, the average equity beta estimate was 1.45 in March 2003 and is 1.64 in the March 2005 AGSM Report.
- Since the ACCC's December 2003 Report, there has been an increase in the equity beta estimates of US Cable TV firms. For a sample of 10 firms with current market capitalisation greater than A\$400 million, the mean equity beta estimate has increased from 1.83 to 1.97 from March 2003 to March 2005, according to data compiled by S&P. For a broader sample of 20 firms the mean equity beta estimate has increased from 1.71 to 1.75 from January 2003 to January 2005 according to ValueLine data.

The data that has become available since the ACCC's 2003 Report indicates an increase in beta estimates over that time. If the ACCC's 2003 analysis were considered to be reasonable, a revised estimate based on the present data must be higher than the 2003 estimate – towards the upper end of the ranges specified above.

2. Analysis of Austar

In estimating an appropriate equity beta estimate for FOXTEL, it is inappropriate to rely exclusively on the analysis of one comparable firm (Austar). For this reason, we subsequently analyse seven Australian Broadcasting & Cable TV companies and ten US Cable TV companies. However, given that Austar is the only Australian listed subscription television business, analysis of its returns are informative and yield the following results:

- The present estimate of Austar's asset beta, using the equity beta reported by the AGSM and the ACCC's de-levering procedure is 3.40. The present equity beta reported by the AGSM is 4.48.
- The Austar beta estimates have not been artificially inflated by outlier data points. Removing the two most extreme returns from the analysis increases Austar's equity beta estimate.
- Estimates of Austar's equity and asset betas are now higher than when the ACCC last addressed the issue in 2003. The estimated equity beta of Austar is 4.48 as reported by the AGSM in March 2005 compared to 4.05 as at March 2003. The AGSM data was the primary data source relied upon by the ACCC in the 2003 decision. Applying the ACCC's de-levering procedure, the implied asset beta is now 3.40, compared to the value of 1.19 as at March 2003.
- The most recent Austar equity beta estimates supplied by the AGSM are based on data subsequent to what has been described as the technology bubble. They are therefore less likely than previous estimates to have been influenced by this market event.

Weight given to Austar analysis

Any consideration of the appropriate beta for FOXTEL must begin with an analysis of Austar, as the most comparable firm for which data is available. Of all firms listed on the Australian Stock Exchange (ASX) Austar is the only company whose primary operation is subscription television. Consequently, this firm was examined closely in relation to the ACCC's consideration of Australian cable television access arrangements in 2003.³ Of course, it would be wrong to rely exclusively on a beta estimate for Austar when determining an appropriate regulatory beta for FOXTEL. This is because betas for individual firms are estimated imprecisely and there are differences between Austar's portfolio of businesses and the FOXTEL business. Nevertheless, of all listed Australian companies Austar is the closest comparable firm that is available and provides the most direct evidence. Consequently, Austar's beta estimate is a central consideration when determining an appropriate regulatory beta for FOXTEL.

Analysis of Present Data

The estimate of Austar's equity beta in the most recent report produced by the Australian Graduate School of Management is 4.48. The procedure for converting equity betas into asset betas is known as de-levering. A number of formulas have been proposed for this purpose and the one that is used by the ACCC is:

³ Relevant reports are available at <http://www.accc.gov.au/content/index.phtml/itemId/269329/fromItemId/356715>.

$$\beta_a = \beta_e \frac{E}{V} + \beta_d \frac{D}{V}$$

where β_a , β_e , and β_d are the asset, equity and debt betas respectively. $\frac{E}{V}$ and $\frac{D}{V}$ are the proportions of equity and debt financing. This procedure is one of the appropriate levering procedures that has been documented in the literature. Moreover, given the relatively low level of debt in the benchmark capital structure in this case, the final weighted-average cost of capital is relatively insensitive to which procedure is selected for this purpose. It is standard to estimate $\frac{D}{V}$ as the book value of short and long term interest bearing liabilities divided by the sum of this and the market value of equity. In the most recent Austar annual report, short and long term interest bearing liabilities are \$373 million and market capitalisation reported by the AGSM is \$1,022 million. Thus, leverage is 27%. Using a debt beta of 0.33⁴, the asset beta is

$$\beta_a = 4.48 \times 0.73 + 0.33 \times 0.27 = 3.4.$$

Consequently, the most recent beta estimate of the closest available comparable firm is 3.4. This estimate is based on the data sources and procedures previously used by the ACCC, but using the most recently available data.

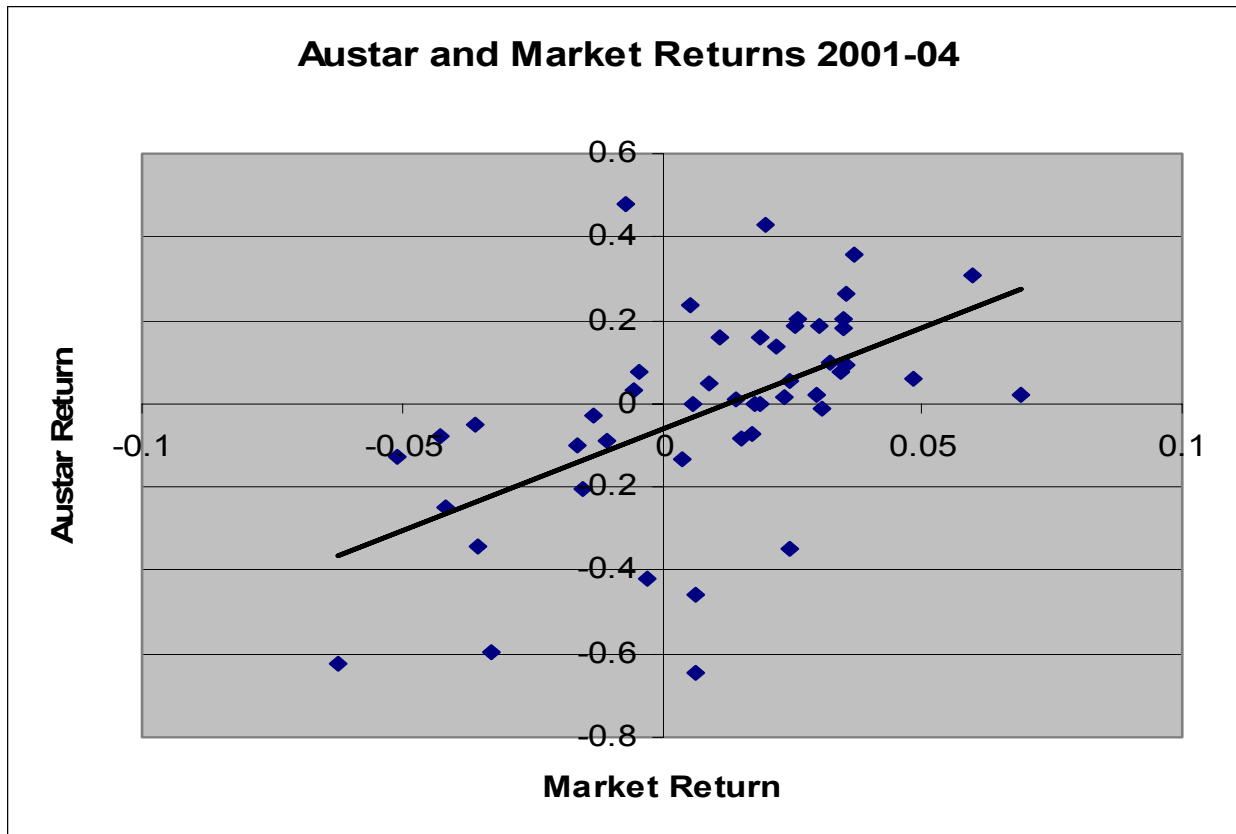
Robustness checks and outlier data points

Statistical beta estimates can be high for two reasons – the stock’s true systematic risk is high or outlier data points in the sample lead to an overestimation of the true beta. Whenever a high beta estimate is reported, it is important to rule out the possibility that the estimate is contaminated by outliers.

This involves two steps. First, consideration must be given to whether it is economically reasonable for the stock to have a high beta. Austar operates in a business that is volatile and closely linked to aggregate market circumstances (e.g., consumer discretionary goods and services are materially affected by recessions).

The second step is to examine the data points that underlie the estimate. This is done in Figure 2 below.

⁴ ACCC, Section 152STA Digital Pay TV Anticipatory Individual Exemption Application Lodged by Foxtel Management Pty Limited, Final Decision, December 2003, acc.gov.au, p. 58.



Source: AGSM Monthly Data File, value-weighted market index, SFG analysis.

Figure 2 shows monthly returns for Austar and for the Value Weighted Market Index with data sourced from the AGSM monthly data file. Each point represents the returns for Austar and the market index for a particular month. The data in the figure are monthly returns over 2001-04. The equity beta is estimated as the slope of the ordinary least squares regression line drawn through the data. For this sample, the slope of the regression line, and equity beta estimate, is 4.48. The R^2 statistic for this regression is 31%, which means that 31% of the variation in Austar returns is explained by variation in market returns. This R^2 statistic is a measure of the informativeness of the regression – a higher value means that the data are more informative about the true relationship between stock and market returns. Of the more than 1,200 beta estimates in the most recent AGSM report, less than 5% have an R^2 statistic as high as 31%.

As well as measuring the information value of the regression, the R^2 statistic also provides an indication of the likelihood that the regression is contaminated by outliers. If one or more outlier data points lie a long way from the regression line, the R^2 statistic will be reduced. In this case, the R^2 statistic is relatively high for an equity beta regression and inspection of Figure 2 confirms that there are no extreme outliers.

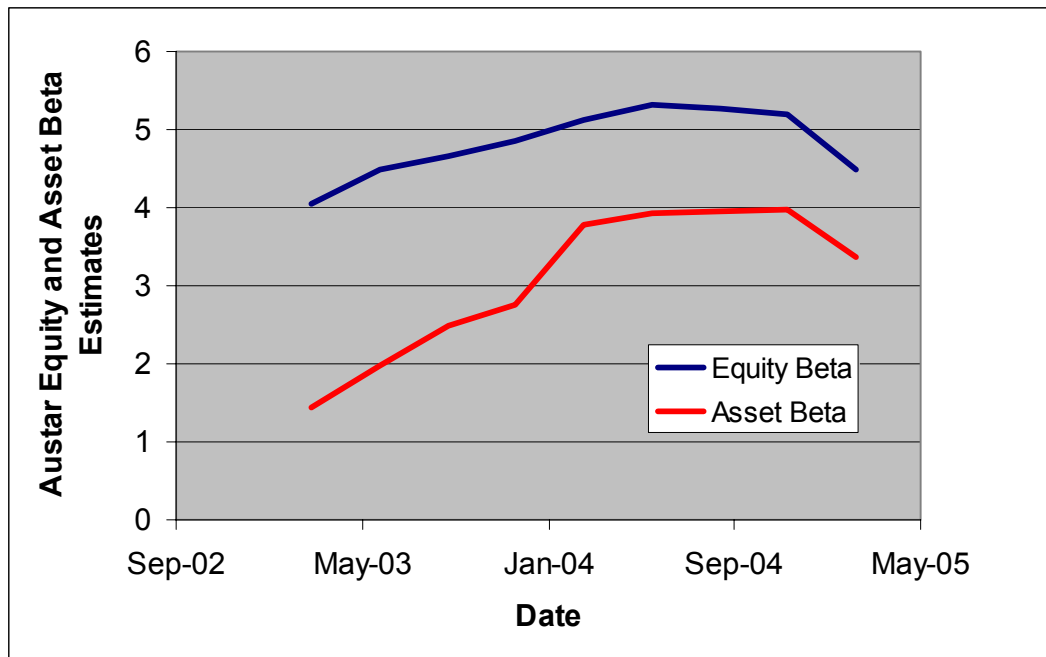
Finally, to test for the effect of outliers the regression model can be re-estimated after having removed the two most extreme returns from the data set. In February 2001 the Austar stock price fell 64% and in January 2004 it rose 47%. Removing these two extreme data points results in the equity beta estimate increasing to 5.08. The R^2 statistic also increases to 41%. That is, if extreme returns have affected the estimate of Austar's equity beta, they are likely to have *reduced* the estimate not inflated it.

2003 analysis by ACCC

In the 2003 Report, the ACCC states that “According to the March 2003 Australian Graduate School of Management (AGSM) data, Austar’s equity beta is 4.05, which is an asset beta of 1.2 applying the Commission’s general approach.”⁵ This implies that the ACCC has used a leverage value of around 77% for Austar.⁶ This is consistent with Austar’s debt of \$421 million as reported in its 2002 Annual report and its equity market value of \$125 million as at 31 March 2003.

Updated analysis

Since the ACCC’s 2003 Report, two additional years of data are available for estimating the beta of Austar. Figure 3 shows the equity and asset beta estimates for Austar beginning in March 2003, which was the data relied upon in the ACCC’s 2003 Report. Equity betas are obtained from the Australian Graduate School of Management (AGSM). Asset betas are computed using the de-levering approach adopted by the ACCC in the 2003 Report. These de-levering calculations require an estimate of the leverage of Austar, which in turn requires estimates of the value of Austar’s debt and equity. Debt is computed as the value of short and long-term interest-bearing liabilities, sourced from Austar’s financial statements. Equity is taken as the market capitalisation reported each quarter in the AGSM beta report. That is, leverage is computed in the standard manner and the ACCC’s own de-levering approach is used.



Source: AGSM Equity beta estimates, de-levered into asset betas using the ACCC approach and leverage computed from Austar annual reports and AGSM market capitalisation data.

Figure 3 illustrates that since the ACCC’s 2003 Report, estimates of Austar’s equity beta provided by the AGSM are substantially higher. Moreover, estimates of Austar’s asset beta, using data from the AGSM,

⁵ Ibid, p.27.

⁶ The ACCC assumes that $\beta_a = \beta_e \frac{E}{V} + \beta_d \frac{D}{V}$ so that $1.2 = 4.05 \times 0.24 + 0.33 \times 0.77$ where a debt beta of 0.33 is used and leverage is assumed to be 77%.

Austar's annual reports and the ACCC's own de-levering procedure are also substantially higher since the 2003 Report.

The estimated asset beta has increased for two reasons. First, the equity beta estimate is substantially higher. Second, Austar's leverage has decreased over the period so that the effect of de-levering is lessened.

In March 2003, Austar's leverage was near its peak at over 70%, in which case the de-levering procedure produces a relatively low asset beta. In May 2003, Austar's leverage decreased as a result of an increase in the market value of equity associated with the announcement of an offer for Austar shares by a subsidiary of Castle Harlan Australian Mezzanine Partners (CHAMP).⁷ CHAMP did not proceed with compulsory acquisition. Leverage was further reduced in August 2003 when Austar completed a \$75 million rights issue. The proceeds were used to repay some bank debt and accrued expenses and to provide for working capital and capital expenditure requirements.⁸ In August 2004, Austar announced a restructuring of its debt that involved effectively replacing some senior debt with hybrid securities (reset preference shares known as STARS).⁹ Also, in the first quarter of 2004, Austar's stock price doubled on the announcement of strong performance and upward revisions to its future prospects. All of these events reduced leverage by increasing the value of equity relative to debt.

Austar's estimated asset beta has risen substantially since the ACCC's 2003 Report. Much of this increase is due to variation in leverage. The March 2003 asset beta estimate, on which the ACCC relies, is at the historical low, caused by the high leverage of Austar at that time. Asset beta estimates after this time are substantially higher.

Thus, the March 2003 estimate is unusually low and this is caused by (i) the temporarily high leverage at this time, and (ii) the fact that the ACCC's de-levering procedure assumes a constant debt beta, which is unlikely to apply to a firm with a high equity beta and more than 70% leverage.

Adjustments for the technology bubble

Annema and Goedhart (2003)¹⁰ use U.S. data to examine the impact on beta estimates of the telecom-media-technology (TMT) stock market bubble of 1998-2001. They note (p. 1) that, "despite volatility in the market during the 20 years before 1998, industry-specific betas were remarkably stable. But during the bubble, betas for many industries appeared to decline significantly...[T]hese apparent decreases actually reflect the influence of telecom, media, and technology share prices on the indexes during the 1998-2001 bubble and distort the real change in the relative risk borne by companies in other industries." They also note (p. 3) that, "recent beta estimates are also more closely in line with pre-1998 values."

Annema and Goedhart (2003) suggest that these issues can be best handled by re-estimating betas after excluding the 1998-2001 period. This has the effect of substantially increasing the estimates of betas to pre-bubble levels. The conclusion from this is that beta estimates based on data from this period may be an aberration. Since such a bubble is not predicted to re-occur continuously in future, the contaminated period should be removed when determining the equity beta that is to be used to estimate the forward-looking cost of equity.

⁷ See http://www.austarunited.com.au/pdf/CHAMP_Offer_Launched.pdf.

⁸ See http://www.austarunited.com.au/pdf/AUSTAR_Finalises_Rights_Issue.pdf.

⁹ See <http://www.austarunited.com.au/pdf/04-08-30%20press%20release.pdf>.

¹⁰ Annema, Andre and Marc H. Goedhart, 2003. "A better beta," *The McKinsey Quarterly*, 1, 6-9.

Australian regulators have expressed some sympathy for this approach and now generally accept that this unique market event is likely to have biased equity beta estimates¹¹.

ESCoSA¹² devotes a subsection to this issue in its recent Draft Decision, noting that, “betas estimated using four or five years of observations will include the period over which the ‘bubble’ in technology-related shares took place. It has been argued by a number of commentators that the ‘bubble’ has substantially reduced the measured betas for U.S. utility firms over the period, making those betas an unreliable guide to the future.” ESCoSA¹³ concludes that, “the results suggest that there is a material risk that the beta estimate provided by the use of observations over the past five years (which include the ‘bubble’) may materially understate the expected (future) beta for this activity.” In the Final Determination, ESCoSA confirms that “the Commission recognizes that the technology bubble may have had an impact on the historical proxy beta values.”¹⁴

If there is some possibility that the data used to estimate an equity beta is contaminated by a unique market episode such as a stock market bubble or crash, the beta can be re-estimated after omitting the contaminated data period. Note that when choosing the risk-free rate it is appropriate to use the rate applicable at the time of the valuation. The same does not apply to beta or market risk premium as these parameters are likely (in reality) to change slowly and are more difficult to estimate. For these reasons, it is appropriate to consider estimates from a range of time periods and to draw conclusions from the totality of the evidence.

Since the ACCC considered this issue, two additional years of data are available. This means that the most recent published beta estimates are based on data almost completely subsequent to the technology period. For example, the most recent betas published by the Australian Graduate School of Management (the same source as relied upon by the ACCC) are based on data from 2001-05. Only the first few months of this period overlaps the technology bubble period identified by Annema and Goedhart (2003).

Recent published equity beta estimates for Austar are uniformly above four. Of course it would be wrong to rely exclusively on such a large value from a single comparable firm. Nevertheless, this does give some indication that the earlier ACCC analysis of cable television betas, and the estimates of beta based on data available on the key valuation dates (1 January 2001 and 31 March 2002) was not inflated by the effects of the technology bubble.

Differences between Austar and FOXTEL

Austar has a portfolio of businesses including cable television, mobile telephony, and dial-up internet services. Although the mobile telephony and dial-up internet businesses were established in 2000, they currently have only 30,000 and 49,000 customers respectively. The cable television business had 400,000 subscribers by 2000 and currently has just over 500,000. Austar delivers a range of television channels to

¹¹ For example, the QCA has recently expressed the view that, “The Authority accepts that the dot-com bubble may have affected the measurement of betas over recent years, and that measures of beta using data from this period may underestimate the true value of beta, including the 0.71 equity beta adopted by the Authority in its 2001 Final Determination.”

¹² ESCoSA Draft 2005 - 2010 Electricity Distribution Price Determination: Part A - Statement of Reasons, p. 171.

¹³ ESCoSA Draft 2005 - 2010 Electricity Distribution Price Determination: Part A - Statement of Reasons, p. 172.

¹⁴ ESCoSA, 2005-2010 Electricity Distribution Price Determination, Part A – Statement of Reasons, p.135.

its subscribers in rural and regional Australia. Austar is the sole provider of subscription television services in substantially all of its service area, primarily using digital satellite technology.¹⁵

In the ACCC's 2003 Report, the ACCC drew a distinction between the systematic risk of Austar and FOXTEL. The ACCC suggested that Austar may have lower systematic risk due to:

- Its operation in rural and regional areas (whose economic fortunes may not be so closely tied to the Australian stock market);
- The fact it has no platform/service competitor; and
- It has other telecommunication services such as mobile telephony and dial-up internet (although this is a relatively small part of the overall business).

Specifically, the ACCC states that “The Commission notes, however, that Austar may have a different risk profile, as it operates in a different area to FOXTEL, does not compete against Optus and supplies other telecommunications services.”¹⁶ That is, even among platform/service providers, Austar may have relatively lower risk.

Conclusions from the analysis of Austar

At the outset, it is important to reiterate that it would be wrong to rely exclusively on a beta estimate for Austar when determining an appropriate regulatory beta for FOXTEL. This is because betas for individual firms are estimated imprecisely and because there are differences between Austar's portfolio of businesses and the FOXTEL business.

Nevertheless, of all listed Australian companies Austar is the closest comparable firm that is available. Consequently, Austar's beta estimate is a central consideration when determining an appropriate regulatory beta for FOXTEL. It should, therefore, be analysed in some detail – as was done in the ACCC's 2003 Report. The analysis above provides additional detail, examines the robustness of the results, and updates the data to the present.

The conclusions that can be drawn from this analysis are as follows:

- The present estimate of Austar's asset beta, using the equity beta reported by the AGSM and the ACCC's de-levering procedure is 3.40.
- The Austar beta estimates have *not* been artificially inflated by outlier data points. Removing the two most extreme returns from the analysis actually *increases* Austar's beta estimate.
- Estimates of Austar's equity and asset betas are now substantially higher than when the ACCC last addressed the issue in 2003. The most recent equity and asset beta estimates are 4.48 and 3.40 respectively. These asset betas are estimated using equity betas supplied by the AGSM, leverage supplied by the AGSM and Austar's annual reports, and the ACCC's own de-levering procedure.

¹⁵ Prior to June 2003, Austar owned and operated the satellite platform. Since that date, the satellite platform has been owned and operated by FOXTEL, with Austar becoming a customer of FOXTEL's satellite services. See <http://www.austarunited.com.au/aboutus/history.asp>.

¹⁶ ACCC. (December 2003). Section 152ATA Digital Pay TV Anticipatory Individual Exemption Application lodged by Foxtel Management Pty Limited: Final Decision. p.58.

- The most recent Austar beta estimates supplied by the AGSM are based on data subsequent to what has been described as the technology bubble. They are therefore less likely than previous estimates to have been influenced by this market event.

Consequently, the data in relation to Austar support a very high asset beta. Moreover, the data that has become available since 2003 supports a substantial increase in the asset beta since that time. Although this is the most direct evidence in relation to the appropriate beta for FOXTEL, it should not be relied upon exclusively. In the remainder of this report, we examine other sources of data and benchmark FOXTEL against this additional data.

3. Equity beta estimates of Australian Broadcasting & Cable TV firms

Because a beta analysis should not be solely based on a single comparable firm, we expand our analysis to the sample of Australian listed firms classified as **Broadcasting & Cable TV** by S&P with current market capitalisation over \$400 million. We examine the most recent beta estimates for these firms computed by the AGSM Centre for Research in Finance. The mean equity and asset beta estimates for these firms is presently 1.64 and 1.29 respectively. These values are both higher than the corresponding estimates from 2003.

Firms in the data set

To expand the set of comparable firms beyond subscription television, we analyse the security returns of seven firms classified as Broadcasting & Cable TV according to the Global Industry Classification System (GICS[®]) of S&P. GICS is a four-tier hierarchal structure for assigning firms into industry groups. The hierarchy is summarised in Table 1, along with the name and industry codes relevant for a comparison with FOXTEL.

Sector classification	Relevant code and sector
10 Economic sectors	25 Consumer discretionary
24 Industry groups	2540 Media
64 Industries	254010 Media
139 Sub-industries	25401020 Broadcasting and Cable TV

Source: S&P

There are 14 ASX-listed firms classified as Broadcasting & Cable TV. We excluded six small firms with current market capitalisation of less than \$400 million as the equity returns of small firms are likely to be fundamentally different to those of larger firms. The largest firm which was excluded had current market capitalisation of only \$130 million. We also excluded Macquarie Communications Infrastructure as the stapled securities issued by this entity are specifically designed to be high-yielding, low volatility securities with low correlation with the overall market. This left seven firms in the Australian sample [Publishing and Broadcasting (PBL), Seven Network (Seven), Ten Network (Ten), Austar, Southern Cross Broadcasting (SCB), Austereo Group (Austereo) and Prime Television (Prime)]. At March 2005, these firms had mean market capitalisation of \$2.3 billion and mean leverage of 26%. At this stage we do not consider other firm characteristics which differ from those of FOXTEL, such as PBL's magazine interests and Austereo's ownership of radio stations rather than television stations. These issues are addressed in detail in Section 4 which examines the different risks of broadcasting and cable television firms. Our intent here is to examine a range of companies to ensure that our final beta estimate is not unduly influenced by the sharemarket returns of one particular firm.

Equity and asset beta estimates

For each firm, we obtain equity beta estimates from the Centre for Research in Finance at the AGSM. We compute asset betas using the ACCC procedure. In particular, the asset beta is computed as:

$$\beta_a = \beta_e \frac{E}{V} + \beta_d \frac{D}{V}$$

where:

β_a = the asset beta, a measure of the systematic risk of the firm's assets, excluding any impact of financial leverage;

β_e = the equity beta, a measure of the systematic risk of equity securities;

β_d = the debt beta, a measure of the systematic risk of debt securities (we use a value of 0.33 consistent with the ACCC's 2003 Decision but with the relatively low amount of leverage that is involved, the final estimate is not highly sensitive to this parameter);

E = the market value of equity;

D = the market value of debt, estimated using the book value of short and long term interest bearing liabilities; and

V = the market value of the firm, equal to $D + E$.

The equity and asset betas for each of the comparable firms is listed in Table 2.

Company				
PBL	10,347	18	1.19	1.04
Seven	1,683	32	1.78	1.32
Ten	1,439	34	1.25	0.94
Austar	1,022	26	4.48	3.40
Southern Cross	819	26	0.85	0.71
Austereo	692	20	0.97	0.84
Prime	379	27	0.97	0.80
Mean	2,340	26	1.64	1.29

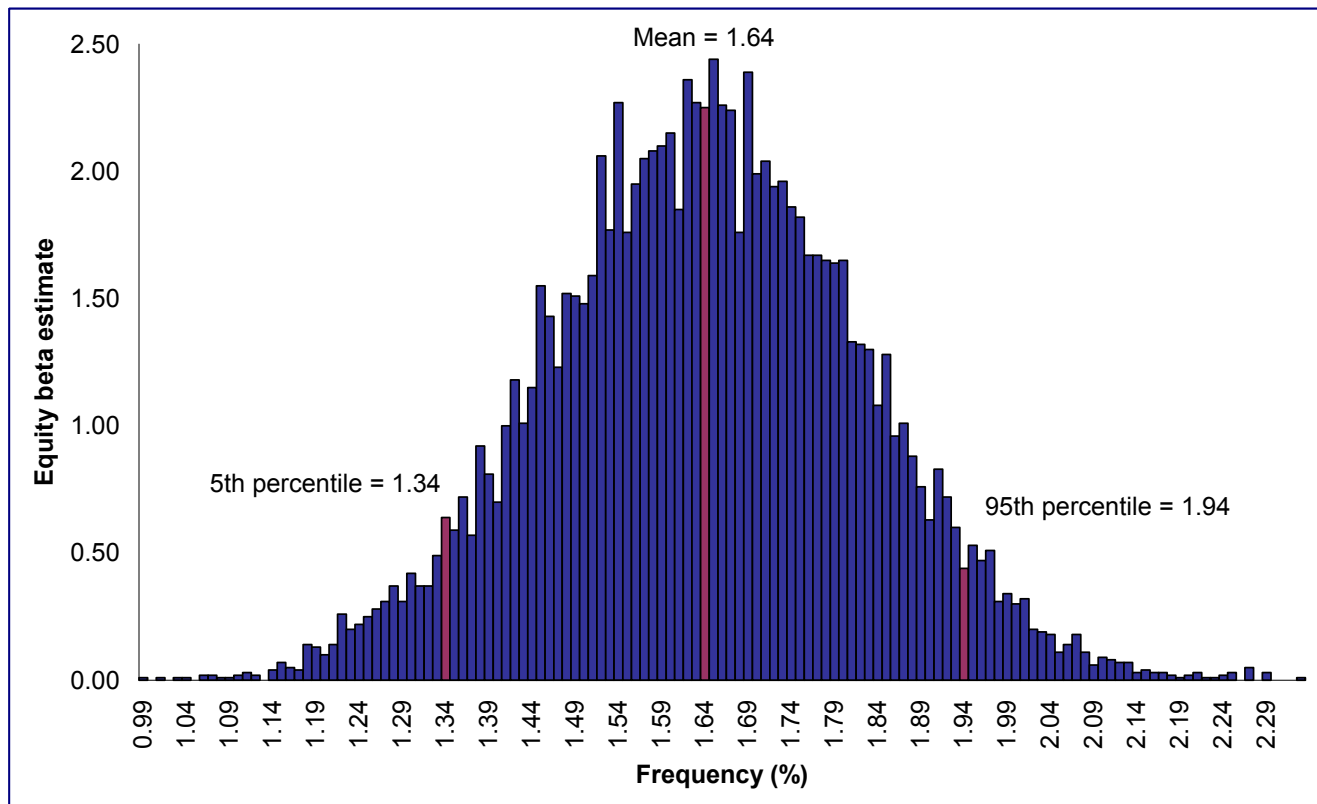
Source: Equity betas are from the Centre for Research in Finance at the AGSM. Asset betas are computed using the ACCC procedure. A debt beta of 0.33 has been assumed throughout.

The mean equity and asset beta estimates for these firms is presently 1.64 and 1.29 respectively. The subsequent section discusses a number of reasons why this group of firms might be considered less risky than FOXTEL such that the results in Table 2 form a lower bound on beta estimates for FOXTEL.

Estimation error and confidence intervals

Given the imprecision with which beta estimates are made, we also estimate a 90% confidence interval for the sample equity beta. We estimate this confidence interval using the statistical procedure known as the bootstrap technique. This involves simulating beta estimates many times where those simulated estimates are derived from the beta estimates and standard errors supplied by the AGSM. The intuition for this procedure is as follows. For each firm in the sample, the regression estimate implied a mean beta estimate (4.48 in the case of Austar, for example). But this estimate may be higher or lower than the true unobservable beta due to sampling error. In the case of Austar, the historical data implies that there is a 90% chance that its true equity beta lies between 2.82 and 6.14. If the true beta of Austar is 6.14 (which implies that our estimate is too low due to sampling error), the mean sample beta would be 1.88 instead of 1.65. Of course, the true betas of other firms may also be higher or lower than the empirical estimate. The probability of such sampling errors is quantified by the standard error of each estimate.

Based on the beta estimate for each firm and its standard error, we simulate the sample outcomes 10,000 times and compute the mean beta estimate for each simulated sample. This sampling distribution is illustrated in Figure 4. It has a mean beta estimate of 1.64, a standard deviation of 0.18 and a 90% confidence interval which ranges from 1.34 to 1.94. This implies that there is a 90% chance that the beta estimate for the average Australian firm classified as Broadcasting & Cable TV lies within the range of 1.34 to 1.94.



Source: Beta estimates and standard errors obtained from AGSM. Distribution of sample means computed by SFG.

To the extent that FOXTEL differs from the average Broadcasting & Cable TV firm, an appropriate beta estimate may come from one end of this range or even from beyond the range. We return, in the subsequent section, to examine how FOXTEL may differ from the average Australian Broadcasting & Cable TV business.

To this point, we have not considered the impact of leverage on the equity beta estimate. It is generally accepted that, all else being equal, an increase in leverage is associated with an increase in the equity beta as the greater interest charges increase the volatility of returns to equityholders. In the case where comparison firms have different leverage to the firm of interest (FOXTEL), the typical approach is to estimate an asset beta by removing the impact of the comparison firms' leverage and then to re-estimate the equity beta by applying an estimated capital structure for the firm under analysis to this asset beta. Computing the asset beta is referred to as de-levering the equity beta and re-computing the equity beta is referred to as re-levering the asset beta. In this instance, comparison firms had mean leverage of 26%, compared to an estimated optimal capital structure of 20% for FOXTEL.

This approach is not as straightforward as it first appears as it necessarily assumes that the comparison firms are inefficiently financed. The underlying assumption of the de-levering/re-levering approach is that the comparison firms and FOXTEL have the same business risk and therefore the same asset beta. But firms make capital structure decisions after taking this business risk into account in order to achieve an optimal capital structure which minimises their weighted average cost of capital (WACC). They make a trade-off between the tax benefits of higher debt finance and the increase in the required returns to debt- and equityholders due to the consequent higher volatility of returns. Firms with above-average leverage are likely to have adopted this position as a direct result of having below-average business risk (that is, below average asset betas). In contrast, firms which finance their operations entirely with equity are likely to do so because they face above-average debt financing costs, which is a consequence of having above-average business risk.

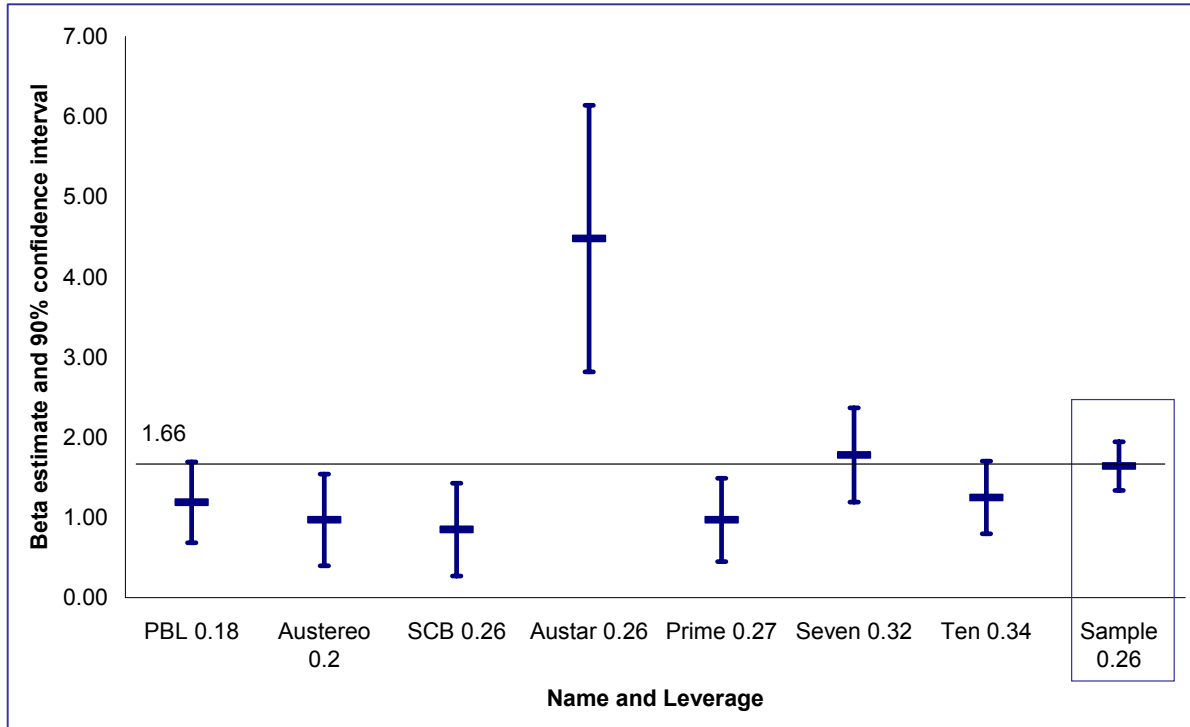
The implication of this analysis is that we have to make a joint assumption about the firms' asset beta and capital structure, which has implications for the way in which equity beta is estimated. These joint assumptions and implications are:

- If a comparison firm and the firm of interest (FOXTEL) are assumed to be efficiently financed and do not necessarily have the same asset beta, we can estimate the equity beta of FOXTEL with reference to the comparison firms' equity betas and without reference to their different leverage.
- If we estimate the equity beta of the firm of interest (FOXTEL) by un-levering the comparison firm's equity beta and then applying FOXTEL's leverage to this asset beta, we necessarily incorporate an assumption that at least one of those firms is inefficiently financed.

This problem is made clear by the lack of any meaningful relationship between leverage and equity beta in the comparison sample. Figure 5 presents the beta estimate for each firm, sorted according to leverage. It also shows the 90% confidence interval for each firm's beta estimate as well as the 90% confidence interval for the full sample. There is little variation in leverage across firms in the comparison sample and no material relationship between leverage and equity beta estimates.

The lack of an empirical relationship between equity beta estimates and leverage is further illustrated by the estimated equity and asset betas presented in Table 3 below. From March 2003, the mean estimated equity beta increased from 1.45 to 1.64, while mean leverage decreased from 42% to 26%. If average asset risk was constant across time, the decrease in mean leverage would be associated with a decrease in mean equity betas. Furthermore, leverage decreased for every firm in the sample due primarily to significant increases in equity market values but only two firms had lower estimated equity betas. This further supports our view that the usefulness of the comparison sample is limited to estimating the appropriate equity beta. Nevertheless even if the comparison sample is used to estimate an appropriate asset beta the data is consistent with an increase in this parameter since 2003.

Figure 5 also illustrates the usefulness of the bootstrap technique in estimating a reasonable range for beta estimates. It shows the mean equity beta estimate and 90% confidence interval for the seven individual firms and for the full sample. For individual firms, the range for the upper and lower bounds of this confidence interval have an average value of 1.39; the maximum upper bound of this range is 6.14 (Austar); and the minimum lower bound is 0.27 (Southern Cross). However the 90% confidence interval for the sample ranges from 1.34 to 1.94, a difference of just 0.60. This occurs because there is only a very small probability that a random sample will result in beta estimates at the very low or very high end of every firm's range.



Source: Leverage obtained from the companies' most recent financial statements. Beta estimates obtained from AGSM. Confidence intervals for each firm's beta estimate computed using standard errors obtained from AGSM assuming t-distributions with 47 degrees of freedom. Confidence interval for the sample estimated by SFG.

Comparison with 2003 Data

Table 3 compares equity and asset beta estimates from March 2003 (which formed the basis of the ACCC's earlier decision) and March 2005 (the most recent report that is available). In 2003, the mean equity beta was 1.45. The ACCC adopted a value of 1.66 for FOXTEL on the basis that its systematic risk is higher than that of the average Australian television firm. The most recent equity beta estimates have a mean of 1.64, which is an increase of 13% relative to the 2003 data. Consequently, the data from Australian Broadcasting & Cable TV firms would, if anything, justify a higher equity beta now than in 2003. The same applies to the analysis of asset betas.

Company								
PBL	10,347	18	1.19	1.04	5,515	32	1.28	0.98
Seven	1,683	32	1.78	1.32	946	47	1.33	0.86
Ten	1,439	34	1.25	0.94	776	41	1.25	0.87
Austar	1,022	26	4.48	3.40	125	77	4.05	1.19
Southern Cross	819	26	0.85	0.71	462	38	0.67	0.54
Austereo	692	20	0.97	0.84	556	26	1.01	0.83
Prime	379	27	0.97	0.80	266	35	0.58	0.49
Mean	2,340	26	1.64	1.29	1,235	42	1.45	0.82

Source: Equity betas are from the Centre for Research in Finance at the AGSM. Asset betas are computed using the ACCC procedure. A debt beta of 0.33 has been assumed throughout.

Conclusions

The 90% confidence interval for the equity beta estimate of a sample of Australian Broadcasting & Cable TV firms is presently 1.34 to 1.94 with a mid-point of 1.64. To the extent that FOXTEL differs from the average Broadcasting & Cable TV firm, an appropriate beta estimate may come from one end of this range or even from beyond the range.¹⁷ The present beta estimates for this sample of firms exceeds the mean equity beta estimate of 1.45 performed in March 2003 when the ACCC first considered this issue.

¹⁷ This issue is examined in the subsequent section.

4. The systematic risk of broadcast versus cable television companies

Whether FOXTEL, as a subscription television business, has more or less systematic risk than the average broadcast television firm is difficult to quantify definitively given the available data. However, it is possible to investigate the relationship between the key drivers of revenue for each type of business and market returns.

FOXTEL has argued that subscription television is a luxury good that exhibits high elasticity. Other parties have argued that the key driver of broadcast television revenues is advertising, which is also closely related to economic circumstances.¹⁸

We examine the relationship between FOXTEL's churn rate (after controlling for the generally downward trend in churn rates) for each six-month period and the return on the ASX200 index over the previous six months. The correlation between these variables is 85% and a regression of churn rates on lagged market returns is highly statistically significant with 70% of the variation in churn rates being attributable to market movements.

We perform a similar analysis of the relationship between total television advertising revenues and lagged market returns. There the correlation is only 62% and the regression analysis suggests that the relationship is statistically insignificant.

This implies that the relationship between churn rates (the primary driver of subscription television revenues) and market returns is stronger than the relationship between advertising revenues (the primary driver of broadcast television revenues) and market returns – in a statistical sense. Although it is impossible, given the available data, to quantify the impact of these relationships on asset and equity betas, we do note the strong and statistically significant relationship between churn rates and market returns.

We also compare equity beta estimates for US Cable TV firms with estimates for firms in industries that rely primarily on advertising revenue. In all cases, the average Cable TV firm has a higher beta than the average firm in other industries. In addition, we estimate a 90% confidence interval for the equity beta of US Cable TV firms. This confidence interval is 1.60 – 2.16, compared to the range of 1.34 – 1.94 estimated for Australian Broadcasting & Cable TV firms. Hence, the confidence intervals overlap in the region of 1.60 – 1.94.

For these reasons, we consider the beta estimates derived from Australian Broadcasting & Cable TV firms to be a lower bound for a reasonable estimate of the beta of a subscription television business such as FOXTEL.

¹⁸ The ACCC, in its Section 152STA Digital Pay TV Anticipatory Individual Exemption Application Lodged by Foxtel Management Pty Limited, Final Decision, December 2003, acc.gov.au, p. 55-56 summarises the arguments as follows: "In the absence of similar businesses, the choice of comparators must be made in light of a more fundamental assessment of the factors affecting systematic risk. Chief among these factors is the likely covariance of the assets' net cash flows to the general economy. Conceptually, the income elasticity of demand is likely to provide a good indicator of this measure. This was a source of much argument: Foxtel essentially argued that the decision to contract for a STU is a highly discretionary decision for consumers. Therefore, one could expect that the income elasticity is very high, which translates to high variability of cash flows, which, in turn, is evidence of a high asset beta. In contrast, C7 argued and presented evidence that subscription television is not a highly systematically risky business which has stable earnings over the economic cycle. This reflects that household consumption is less susceptible to economic cycles than is business expenditure, such as advertising. C7 submitted that free-to-air and other media companies, which generate significant revenues through advertising, could hence be expected to have higher betas than Foxtel's STU business, even though the total risk of these firms may be much less."

Approach

Whether the subscription television business has a higher beta (or systematic risk) than the broadcast television business depends on the relationship between the stock returns for each type of business and returns of the aggregate market. It is difficult to obtain direct evidence on this relativity due to the small number of comparable firms in the Australian market. Therefore, we employ a two-fold approach to investigating this issue.

First, we compare equity beta estimates for US Cable TV firms with estimates for firms in industries that rely primarily on advertising revenue. This evidence is direct in the sense that we compare equity betas, but it is indirect in the sense that there is no specific sample of broadcast television businesses and the data is from a foreign market.

Second, we identify the key revenue drivers for each type of business in Australia. Cable TV revenues are driven by subscriber numbers and broadcast television revenues are driven by advertising expenditure. We obtain data on each of these variables and compare their relationship with the return on a broad stock market index. This provides an indication of the statistical significance of the relationship between key revenue drivers and market returns, which is an important component of systematic risk.

Qualitative arguments and empirical analysis

Our intent with this approach is to quantify the impact of qualitative arguments relating to the direction of FOXTEL's systematic risk relative to broadcast television businesses. It is important to present these theoretical arguments in a rigorous framework because intuitive arguments can always be made to support higher or lower beta estimates. Without an analytical framework and some empirical data it can be difficult to distinguish between two qualitative arguments.

For example, it has been argued that free-to-air television is exposed to more risk than cable television, because advertisers can respond very quickly to changes in consumer confidence, while cable subscribers will be affected by inertia and some proportion are locked in to 12- or 24-month contracts. Alternatively, it could be argued that the driver of systematic risk is the rate at which new subscribers enter into contracts, which is even more affected by economic fluctuations than advertising revenues. Both of these arguments rely on facts which are not in contention – advertisers alter their advertising budgets and consumers subscribe and un-subscribe to pay television. But the relative merits of each argument are best assessed with empirical evidence.

Another example is found in the ACCC decision in 2003 in which the ACCC made a distinction between the risk to FOXTEL's content and STU sub-businesses. The ACCC considered that the risk to the STU business was less than the content business because the content business must amortise a large fixed cost over an uncertain customer base. In contrast, the STUs are leased and can be re-issued to additional customers if a customer disconnects. However the revenue from the STU business is entirely a function of subscriber growth and churn while the revenue from the content business is diversified amongst advertising revenue and subscription fees and the variation in these revenue streams is only partly affected by subscriber growth and churn. Therefore it could be argued that returns to the STU sub-business are even more affected by economic fluctuations than the content business. With potential qualitative arguments providing support for both higher and lower systematic risk, it is important to refer to empirical evidence in determining their possible effects on equity beta.

US evidence on industry sector systematic risk

In larger markets, such as the United States, it is possible to compare the beta estimates of Cable TV firms with those of other consumer discretionary industries with a substantial dependence on advertising. For example, ValueLine reports beta estimates for 100 different sectors of the US market, including Cable TV. Average equity betas for the relevant industry groups are reported in Table 4.

Cable TV	20	1.75	1.71
Advertising	34	1.23	1.19
Entertainment	87	1.40	1.18
Newspaper	19	0.84	0.85

Source: ValueLine. Available at www.stern.nyu.edu/~adamodar

Table 4 indicates that the average Cable TV firm has a higher beta estimate than the average Advertising, Entertainment or Newspaper firm. Given the small number of broadcast television businesses, and the fact that they tend to be held as part of much larger conglomerates, it is impossible to directly compare the equity betas of the cable and broadcast television businesses. However, the evidence in Table 4 suggests that the systematic risk of the Cable TV businesses is higher than that of other businesses that depend substantially on advertising revenues.

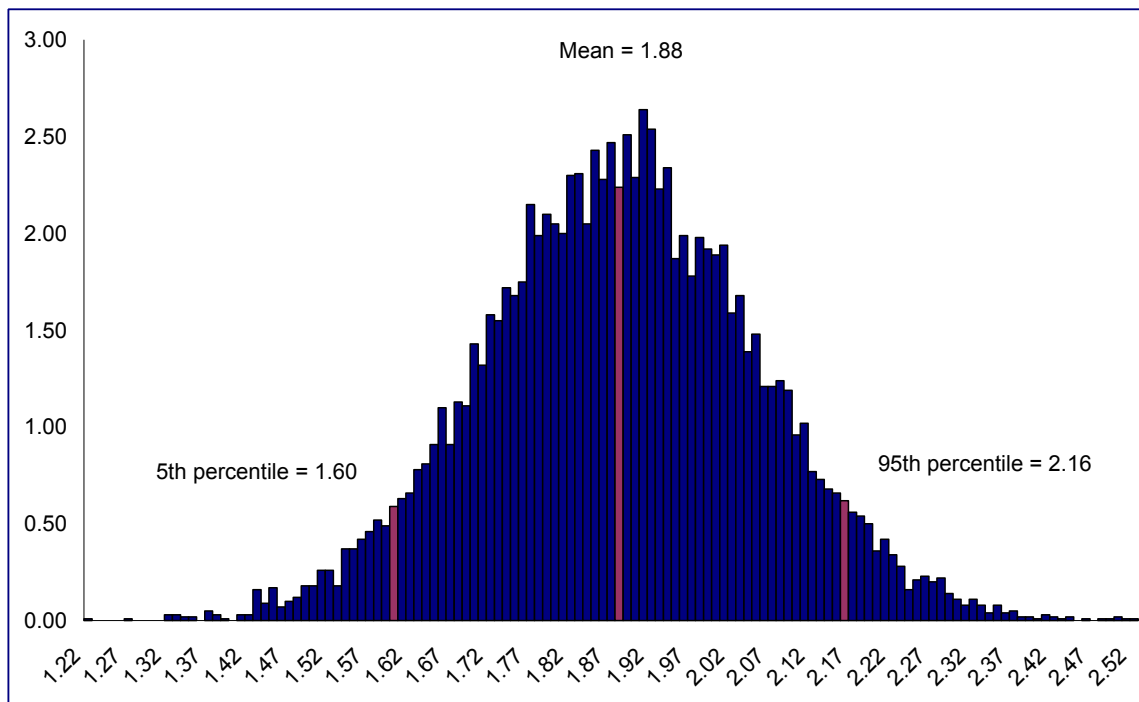
Equity beta estimates of US Cable TV firms

Of the 20 firms classified as Cable TV in the above table, we were able to obtain data on 10 firms with current market capitalisation above A\$400 million. We obtained equity beta estimates from S&P, based on five years of monthly returns ending in March 2005. The mean equity beta for this sub-sample was 1.97, slightly higher than the mean estimate of 1.83 applicable to March 2003. These equity beta estimates, as well as asset beta estimates derived using the ACCC de-levering procedure, are reported in Table 5.

Company									
Comcast	74,724	24	0.76	0.62	64,275	30	0.91	0.73	
Echostar Comm	13,328	30	1.37	1.07	13,891	33	2.47	1.92	
Cablevision	8,073	58	1.78	0.94	5,320	65	1.61	1.01	
Rogers Comm	7,497	47	1.71	1.06	2,292	64	1.44	0.87	
United Global	7,475	40	3.43	2.25	1,266	76	3.06	1.57	
Crown Media	942	47	2.30	1.50	287	74	2.22	1.19	
Mediacom Comm	741	80	1.89	0.69	1,043	75	1.87	0.99	
I-Cable Comm	732	0	1.84	1.84	451	0	1.42	1.42	
Insight Comm	704	80	1.56	0.82	718	80	1.60	1.43	
Charter Comm	488	98	3.02	0.83	245	99	1.69	1.67	
Mean	11,473	50	1.97	1.15	8,979	60	1.83	1.28	

Source: S&P equity betas are estimated using 5 years of monthly returns ending in April 2005. The market index used in computations is the S&P500. Asset betas are estimated using the ACCC's preferred method of de-levering, where the debt beta is estimated with reference to the firms' credit ratings and the yield implied by the relevant Lehman Brothers Corporate Bond Index. Where the firm was not rated, we used the median debt beta of sample firms for that year.

In order to estimate a distribution of sample means we performed our own beta calculations, which resulted in a mean beta estimate of 1.88. Using the same bootstrap method described earlier, we were able to form a distribution of sample means. We formed 10,000 simulated samples of 10 beta estimates, based on the mean estimates appearing in Table 5 and their associated standard errors. Our objective is to form a 90% confidence interval for the estimated equity beta of a US-listed Cable TV firm. This sampling distribution and 90% confidence interval is illustrated in Figure 6.



Source: Beta estimates performed by SFG using returns data obtained from S&P. The distribution of sample means is estimated by SFG.

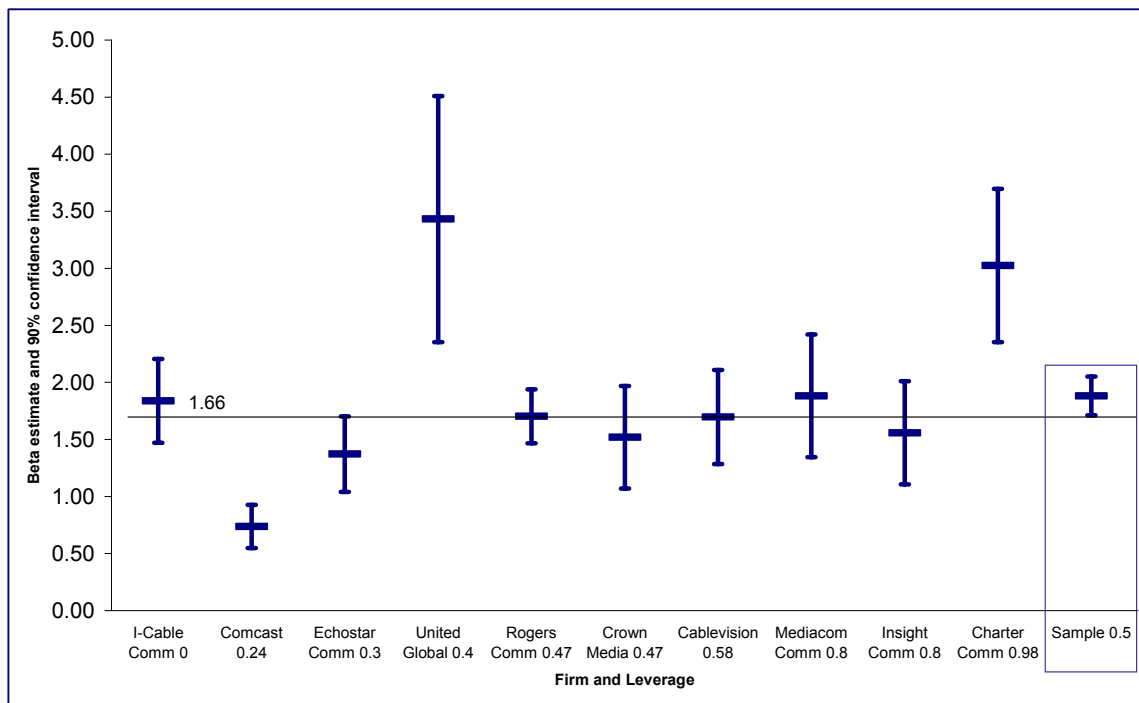
The mean beta estimate is 1.88 within a 90% confidence interval of 1.60 – 2.16. This confidence interval is formed after taking into account the estimation error underlying each firm’s beta estimate. Thus it can be interpreted as a reasonable range for the estimated equity beta of a US Cable TV firm. Of course this confidence interval does not account for the systematic differences in the risk of US and Australian stocks and does not take into account that Foxtel may exhibit characteristics which are different from the typical Cable TV firm. But the US data provides corroborating evidence in support of the equity beta range implied by Australian firms. From our analysis of these two datasets, we can conclude that:

- Based on a sample of 7 Australian Broadcasting and Cable TV firms, the estimated equity beta is 1.64 within a 90% confidence interval of 1.34 – 1.94. These firms had mean market capitalisation of \$2.3 billion and mean leverage of 26%
- Based on sample of 10 US Cable TV firms, the estimated equity beta is 1.88 within a 90% confidence interval of 1.60 – 2.16. These firms had median market capitalisation of US\$11.4 billion and mean leverage of 50%.
- These confidence intervals overlap in the region of 1.60 – 1.94.

As discussed in our analysis of Australian firms, we consider computation of the asset beta to provide little relevant information in estimating FOXTEL’s equity beta. Recall that this type of analysis necessarily assumes that either comparison firms or the firm of interest (FOXTEL) are inefficiently financed. This implicit assumption necessarily follows from the assumption that comparison firms and the firm of interest have the same asset beta. Finance theory suggests that optimal capital structure is contingent upon business risk so that firms with a lower asset beta will adopt greater leverage and vice versa. For the comparison sample, leverage ranged from 0 to 98%. This means that if business risk was constant across the sample, we would observe materially greater equity betas for the highly-gearred firms.

The data presented in Figure 7 shows no significant relationship between leverage and the estimated equity beta and that the US sample exhibits considerably higher leverage than the Australian sample. This higher leverage is largely the result of the declining equity value of US stocks during the period under study. Charter Communications, Insight Communications and Mediacom Communications have earned total returns of -93%, -58% and -66% since listing in late 1999 and early 2000, near the peak of the US equity market. Hence, their leverage of 80-98% can be attributed to a significantly decline in equity values, rather than an explicit capital structure choice. This means that the mean leverage figure of 50% for US Cable TV firms is unlikely to be the optimal capital structure for firms in this industry.

Figure 7 also provides a useful illustration of how the distribution of sample means can be used to construct a meaningful confidence interval for the estimated equity beta. The figure shows the equity beta estimate for each firm and 90% confidence intervals sorted according to leverage. It also shows the mean and 90% confidence interval from the distribution of sample means, illustrated in Figure 6. On an individual firm basis, the beta estimates provided by regression analysis are subject to material estimation error. But the estimation error inherent in the distribution of sample means is considerably reduced.



Source: Leverage computed from market capitalisation and debt figures obtained from S&P. Equity betas and confidence intervals estimated by SFG using returns data obtained from S&P.

Australian evidence on the market sensitivity of churn rates

Because Australia has only one listed cable television firm, it is difficult to draw any strong conclusions between the relative betas of the Broadcasting & Cable TV businesses here. Consequently, we have analysed the systematic risk of the key drivers of revenue for each business.

The cable television business relies primarily on subscription revenues. The risk of this revenue stream is systematic to the extent that subscribers are more likely to cancel their subscription (or fail to pay) if economic circumstances are poor. The cancellation of a subscription is significant to a cable television business because of the costs involved in obtaining a replacement subscriber. For example, in 2004 FOXTEL spent [Confidential] in subscriber acquisition costs. This yielded [Confidential] new subscribers¹⁹, at a cost of [Confidential] each.²⁰

The same applies to all subscription type businesses with large retail customer bases. For example, gas and electricity retail businesses also bear a significant cost with each lost customer. Consequently, this type of business tends to closely monitor what is known as customer **churn**.

FOXTEL defines the subscriber churn rate as the number of cancelled subscriptions as a proportion of the total subscriber base, expressed as an annualized rate. Cancellations include voluntary cancellations and those that are involuntary due to non-payment.

As a relatively new business in a new industry, it is expected that FOXTEL's churn rate would be decreasing over time. Some of the earlier customer churn is likely to be due to customers who sample the product and then cancel because they do not believe the product is of sufficient value to warrant the cost. This is likely to decrease over time as such customers sample once and then do not return. This decline in the churn rate is largely predictable and therefore does not represent a source of risk. The actual churn rate for FOXTEL, measured on a six-month basis, is graphed in Figure 8.

¹⁹ This is computed as the increase in total subscribers over the year plus the replacement of cancelled subscriptions. Data was provided by FOXTEL.

²⁰ These figures are from the FOXTEL Profit and Loss Summaries and the Customer Subscription and Churn Data that was provided to me.

[CONFIDENTIAL]

In terms of the effect on systematic risk, we are interested in the component of the churn rate that is not predictable (i.e., there must be some risk) and the extent to which this is related to broad market movements (i.e., the risk must be systematic). To examine this, we measure the unexpected churn rate as the difference between the actual churn rate and the trend line in Figure 8. We then compare the unexpected churn rate in each six month period with the return on the ASX 200 stock index over the previous six months. This measures the extent to which a market decline over a six-month period impacts the rate at which subscriptions are cancelled over the subsequent six-month period. This relationship is graphed in Figure 9.

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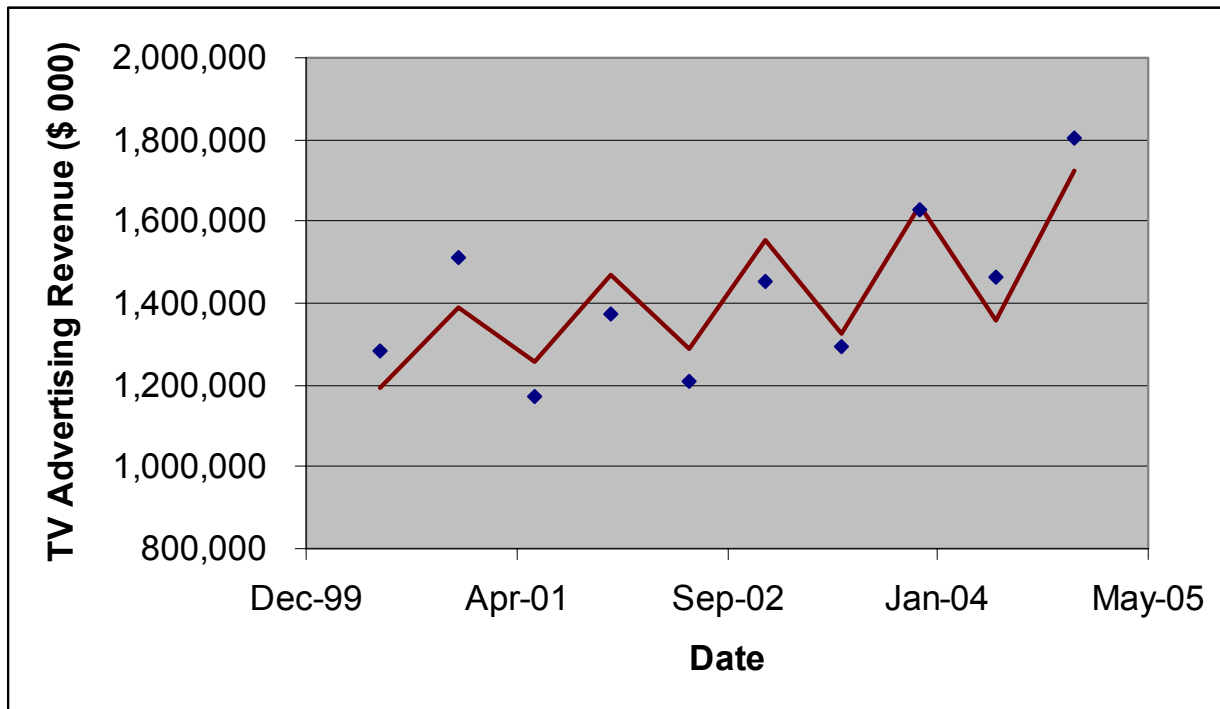
The relationship between the unpredictable component of the churn rate and the lagged market return is statistically very strong. The correlation between these variables is 85%, which is indicative of a very strong relationship. An ordinary least squares regression of the unexpected churn rate on lagged market returns is highly statistically significant. This is the solid line displayed in Figure 9. In particular, the relationship between the variables is statistically significant with probability better than 99%. Also, more than 70% of the variation in churn rates is attributable to stock market movements. This all indicates a strong and consistent relationship between the unpredictable churn rate and market returns, which confirms the systematic nature of churn risk – to the extent that subscriber churn is unpredictable and risky, it appears to be driven mainly by broad market movements. This implies that subscribers are significantly more likely to cancel their subscription after a market downturn than after a market rise.

Australian evidence on the market sensitivity of advertising revenue

We have performed a similar analysis of the market sensitivity of advertising revenue, which is the key revenue driver for broadcasting businesses. Here, we analyse data on the total amount spent on television

advertising in the Australian market. We use the same data frequency and time period as for the churn data above, so that valid comparisons can be made.

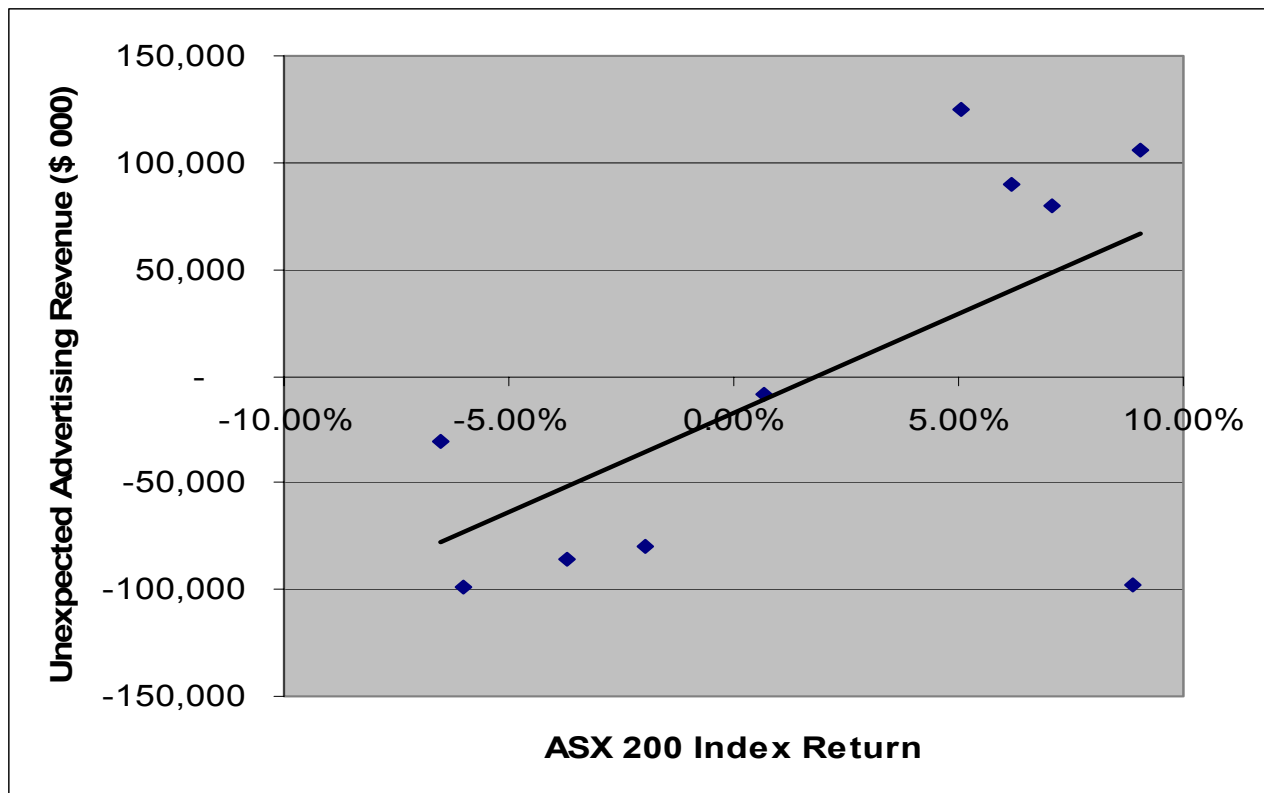
In this case, there is an upward trend as the size of the television advertising market grows over time. Also, there is a clear seasonal effect as advertising revenues tend to be substantially higher in the second half of each year. As with the churn data, we begin by removing these predictable (non-risky) components. This is illustrated in Figure 10.



Source: Television advertising revenue is obtained from the Commercial Economic Advisory Service of Australia. Stock index data is obtained from the Reserve Bank of Australia.

As for our analysis of churn data, we are interested in the component of advertising revenue that is not predictable (i.e., there must be some risk) and the extent to which this is related to broad market movements (i.e., the risk must be systematic). To examine this, we measure unexpected advertising revenue as the difference between the actual revenue and the seasonal trend line in Figure 10. We then compare the unexpected advertising revenue in each six month period with the return on the ASX 200 stock index over the previous six months – exactly as we did for the churn rate above. This measures the extent to which a market decline over a six-month period impacts television advertising revenues over the subsequent six-month period. This relationship is graphed in Figure 11.

The relationship between the unpredictable component of television advertising revenue and the lagged market return is not as strong as for the churn rate above. The correlation between these variables is 62% (85% for churn rate). An ordinary least squares regression of the unexpected advertising revenue on lagged market returns is *not* statistically significant at usual levels. This is the solid line displayed in Figure 11. About 30% of the variation in advertising revenue is attributable to stock market movements.



Source: Commercial Economic Advisory Service of Australia, www.ceasa.com.au.

Conclusions

These analyses indicate that the relationship with market returns is stronger and more consistent for churn rates than for television advertising revenue. Although it is impossible, given the available data, to quantify the impact of these relationships on asset and equity betas, we do note the strong and statistically significant relationship between churn rates and market returns.

This reaffirms the ACCC’s qualitative analysis as part of its 2003 Report. In that report, the ACCC qualitatively assessed the arguments about whether subscriber churn or television advertising was likely to be more sensitive to broad market movements. In its final decision, the ACCC assigned a beta to FOXTEL that was higher than the average beta of Australian broadcast television firms, considering FOXTEL to be riskier than this set of firms. The above analysis is consistent with this conclusion.

5. Conclusions

In this report, we estimate the equity beta of FOXTEL with reference to Austar, the only listed subscription television service in Australia, a set of seven Australian Broadcasting & Cable TV firms and a set of 10 US Cable TV firms. We analyse the returns on these securities using the same methodology that is employed by the ACCC. Specifically, we use the ACCC's preferred data source for Australian beta estimates (AGSM) and use the same technique for converting equity betas to asset betas. For US data, we source beta estimates from S&P and ValueLine who use similar estimation techniques to that employed by the AGSM.²¹

We compare estimates of equity and asset betas at March 2005 and March 2003, when the ACCC last ruled on this issue. These estimates are summarised in Table 6.

Analysis						
Austar	AGSM	4.48	4.05	3.40	1.19	
Australian Broadcasting & Cable TV Firms	AGSM	1.64	1.45	1.29	0.82	
US Cable TV Firms	ValueLine	1.75	1.71	1.14	1.01	
US Cable TV Firms	S&P	1.97	1.83	1.15	1.28	
ACCC Analysis	ACCC		1.66		1.40	

Given the statistical imprecision inherent in beta estimates, we compute 90% confidence intervals for the equity betas of Australian Broadcasting & Cable TV firms and US Cable TV firms. These confidence intervals are 1.34 – 1.94 for the Australian firms and 1.60 – 2.16 for the US firms. Hence, these confidence intervals overlap in the region of 1.60 – 1.94.

Estimates of the comparable firms' asset beta range from 3.40 for Austar, 1.29 for Australian Broadcasting & Cable TV firms and 1.14 for US Cable TV firms. The changes in estimated asset beta from 2003 to 2005 are largely attributable to changes in estimated leverage over this period, given that equity beta estimates were relatively stable. This supports our contention that FOXTEL's equity beta should be estimated with reference to the equity beta of comparable firms given that asset beta estimates are highly sensitive to the equity market value of comparable firms.

We also present evidence that subscription television firms are likely to face higher business risk than free-to-air television firms. First, the mean equity beta for US Cable TV firms exceeds mean beta estimates for firms in other consumer discretionary industries whose revenue is largely derived from advertising (Advertising, Entertainment and Newspapers). Second, we show a statistically significant relationship between unexpected churn rates and the lagged six month return on the ASX200. Over 70% of the variation in churn rates relative to trend is associated with prior sharemarket movements, which highlights

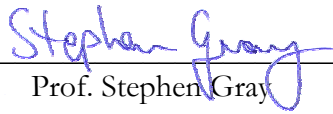
²¹ The only difference in estimation technique is that these data providers use five years of monthly returns to estimate beta estimates, as opposed to four years of returns used by the AGSM.

cable television's sensitivity to consumer confidence. Only about 30% of the variation in unexpected advertising revenue can be explained by stock returns.

Our conclusions are that:

- **Based on a full consideration of all of the available evidence, we are of the view that a reasonable estimate of FOXTEL's present equity beta is from the range of 1.5 to 1.8. This is consistent with an asset beta (using the ACCC approach) from the range of 1.3 to 1.5.**
- **The data that has become available since the ACCC's 2003 Report indicates an increase in beta estimates over that time. If the ACCC's 2003 analysis were considered to be reasonable, a revised estimate based on the present data must be higher than the 2003 estimate – towards the upper end of the ranges specified above.**

Signature


Prof. Stephen Gray

Tuesday, 4 October 2005
Date